REPORT

OF THE

CANADIAN ARCTIC EXPEDITION 1913-18

VOLUME IX:
ANNELIDS, PARASITIC WORMS, PROTOZOANS, ETC.

PART M: FORAMINIFERA

By JOSEPH A. CUSHMAN

SOUTHERN PARTY, 1913-16

OTTAWA
J. de LABROQUERIE TACHE
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1920

Issued February 6, 1920

The Foraminifera of the Canadian Arctic Expedition, 1913–18.

By Joseph A. Cushman.

(With one plate.)

The bottom samples collected by the Canadian Arctic Expedition by Mr. Frits Johansen were sent to me for examination and report. The area covered by the material is an interesting one, from which practically no records of foraminifera are available. The actual amount of material sent me was very small indeed, but careful searching has given a number of species. Most of these are of service in checking the work of Awerinzew on the Siberian Arctic, and of Kiaer on the American and European Arctic. In this way it rounds out the circumpolar distribution of certain species, such as *Hyperammina subnodosa*, which was not found by Kiaer in the American Arctic, but which is abundant north of Siberia. The Canadian Arctic material has this species as its most abundant form.

The whole assemblage seems to call renewed attention to the fact that many species of foraminifera are limited in their distribution to conditions of temperature, especially certain species, such as *Polystomella arctica*, are limited to the circumpolar area, with certain localized extensions southward. Others, while abundant in the Arctic, are now found in the Antarctic, and in the deep cold waters of the ocean basins between, a distribution known from other invertebrate groups as well.

Other species apparently of world-wide distribution have wide differences in different areas and, when a considerable series is available for study, it will probably be found that several distinct species or varieties have been included under one name. The tendency has been too much to ignore the various differences developed, and to place under one name different things from widely separated areas. Again, there has been a tendency to broaden the original characters of a species until it may now take in a wide range of forms, the real relations of which are obscured by such a method. Where a species is represented by abundant specimens, the striking thing is always the great uniformity rather than the wide variation which might be expected, but which does not occur. Most of the variablity can be directly traced to different stages in the life-history, either developmental characters, or to the alternation of generations where both microspheric and melagospheric forms occur. With these taken into consideration, the amount of variation will usually be found to be surprisingly small.

If real progress is to be made in solving the distributional problems of our foraminiferal fauna, a close study must be made of differences wherever they occur. Such a study will undoubtedly lead to a greater refinement in systematic work on the group.

Stations from which Material was examined with Species of Foraminifera at each Station.

13*l*. Bering Sea, Alaska. 54° 24′ N.; 160° 55′ W.; 57 fathoms. July 1, 1913. A small amount of rounded sand grains, no foraminifera.

16*d*. Bering Sea, Alaska. 59° 17′ N.; 165° 39′ W.; 13 fathoms. July 5, 1913. A small amount of rounded sand grains, no foraminifera.

16*f*. Bering Sea, Alaska. 59° 34′ N.; 167° 48′ W.; 13 fathoms. July 5, 1913. A small amount of fine rounded sand grains, no foraminifera.

16*g*. Same station as preceding, no foraminifera.

20 *b-c*. Grantley harbour (Port Clarence), Alaska; 2-3 fathoms. July 30,

1913. Sandy mud, with algæ. Numerous small foraminifera.

Tholosina vesicularis, Ammobaculites cassis, Trochammina squamata, Verneuilina polystropha, Bulimina pyrula, Polystomella striato-punctata.

20*g*. Port Clarence, Alaska; 2-3 fathoms. August 4, 1913. Sandy mud, with algæ. No foraminifera.

22. 69° 35′ N.; 163° 27′ W.; 11-12 fathoms. Rocks and sand, with algæ. August 17, 1913.

Quinqueloculina subrotunda, Truncatulina lobatula.

23. Northwestern coast of Alaska; 9-10 fathoms; 70° 24′ N.; 161° 25′ W. August 19, 1913. Mud and pebbles, with a slight amount of fine mud. Few foraminifera.

Haplophragmoides canariensis, Nonionina depressula, Quinqueloculina subrotunda.

27*s*. Collinson point, Alaska; 3 fathoms. October 3, 1913. Sandy mud, with pebbles and algæ.

Trochammina nana, Bulimina pyrula, Polystomella striato-punctata, Cornuspira foliacea.

29*a*. Off Martin point, Alaska; 15 fathoms; about 70° 9′ N. March 24, 1914. Sandy mud.

Bulimina pyrula, Cassidulina crassa, Cassidulina laevigata, Lagena laevigata, Truncatulina pygmæa, Polystomella striato-punctata.

29*c*. A little north of 29*a*; 16 fathoms. March 25, 1914. Sandy mud. No foraminifera.

29*e*. West of Herschel island; about 25 fathoms. About 70° 3′ N.; 141° W. April 2, 1914. Sandy mud, with stones.

Truncatulina lobatula.

29*g*. West of Herschel island; 150 fathoms. About 70° 20′ N.; 140° 30′ W. April 6, 1914. One haul, vertical plankton net, No. 5. A few very small foraminifera.

Trochammina nana, Spiroplecta biformis, Cornuspira foliacea, Quinqueloculina seminulum.

29*j*. Beaufort sea, Alaska. April 14, 1914. About 20 miles off International Boundary (between Alaska and Yukon Territory). Mud from a dirty ice-cake in pack ice. Waterdepth at collecting-place about 15 fathoms.

Cassidulina crassa, Nodosaria aequalis, Polymorphina lanceolata, Polystomella arctica, P. subnodosa, Cornuspira foliacea.

41. Bernard harbour, Northwest Territories; 3-5 fathoms, July 20, 1915. Sandy mud. One large specimen of *Cornuspira foliacea*. No other Foraminifera.

41*c*. Bernard harbour, Northwest Territories; about 5 fathoms. July 28, 1915. Gray mud. A few large *Cornuspira foliacea*. No other Foraminifera.

43*a*. Dolphin and Union strait (off Cockburn point). About 100 meters. September 13, 1915. Gray mud, with pebbles.

Hyperammina subnodosa, Tholosina bulla, Haplophragmoides canariensis, Nonionina stelligera, Polystomella arctica, Truncatulina lobatula.

43*b*. Dolphin and Union strait (off Stapylton bay). About 60 meters. September 14, 1915. Gray mud, with pebbles.

Hyperammina subnodosa, Tholosina bulla, Cassidulina crassa, Truncatulina lobatula.

43*c*. Dolphin and Union strait (west of Cockburn point). 20-30 meters. September 14, 1915. Gray mud, with stones.

Trochammina squamata, Verneuilina polystropha, Nonionina depressula, Nonionina stelligera.

43*g*. Outer harbour, between Chantry island and mainland, Bernard harbour, Northwest Territories; 60-70 feet. End of October, 1915. Fine sandy mud.

Textularia gramen (?).

SPECIES OF FORAMINIFERA OBTAINED BY THE CANADIAN ARCTIC EXPEDITION.

Hyperammina subnodosa H. B. Brady.

(See Plate I, figures 1, 2.)

Rhabdopleura species, G. M. Dawson, Ann. Mag. Nat. Hist., ser. 4, vol. 7, 1871, p. 86 fig. 7.

Hyperammina subnodosa H. B. Brady, Rep. Voy. Challenger, Zoology, vol. 9, 1884, p. 259, pl. 23, figs. 11-14.—Awerinzew, Mem. Acad. Imp. Sci. St. Petersburg, ser. 8, vol. 29, No. 3, 1911, p. 12.—Cushman, Bull. 104, U. S. Nat. Mus., pt. 1, 1918, p. 76, pl. 29, figs. 7, 8.

Specimens are abundant from station 43*a*, and occur at 43*b*. The largest specimen measures 22 mm. in length, which seems to be a record for the species. The proloculum is well marked, usually slightly greater in diameter than the remainder of the test. The constrictions are well marked and numerous. The wall is composed of rather fine sand grains of nearly uniform size light reddish brown in colour, the apertural end much constricted in perfect specimens, the aperture itself a small, simple, irregularly rounded opening. The tubes usually have specimens of *Tholosina bulla* attached to the exterior.

The finding of this species in abundance is especially interesting, as it is one of the species not found by Kiaer in the material collected by the *Fram* in the second Norwegian Expedition, in the region to the north of that in which the Canadian Arctic Expedition material was collected. Awerinzew in his work has considered *H. subnodosa* as one of the most characteristic species of the Arctic. Along the Arctic coast of Siberia it is one of the commonest species. Schlumberger recorded it from the cold water of the Okhotsk sea, and I have had it from the same locality. Brady in the *Challenger* report mentions that some of the finest specimens he had were from the coast of Greenland. In the Atlantic I have found the species very abundant in very cold water, with bottom temperatures below the freezing point, north of the Grand Banks of Newfoundland. Pearcey records it from the Antarctic, and it is known from deep cold waters in various parts of the ocean basins.

Tholosina bulla (H. B. Brady.)

(Plate I, figures 1, 2.)

Placopsilina bulla H. B. Brady, Quart. Journ. Micros. Sci., vol. 21, 1881, p. 51: Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 315, pl. 35, figs. 16, 17.

Tholosina bulla Rhumbler, Nachr. Königl. Ges. Wiss. Göttingen, 1895, p. 82.—Kiaer, Norske Nordhavs Expedition, No. 25, 1899, p. 4.—Cushman, Bull. 104, U.S. Nat. Mus., pt. 1, 1918, p. 63, pl. 25, fig. 6.

Specimens are numerous at stations 43*a* and 43*b* attached to the outside of the tubes of *Hyperammina subnodosa*, sometimes six or more being attached to a single tube. The walls of *T. bulla* are made up of much finer material than the tubes to which they are attached, showing a definite selective power of the organism, usually of whitish grains, in decided contrast to the darker red colour of the *Hyperammina* tubes. Near the edge are numerous acerose sponge spicules. On the outside, especially near the top, are larger fragments of pebbles or other foraminifera tests. These occur especially on the outside of the largest specimens. In general, the longest diameter is in the direction of the long axis of the tube to which it is attached. The wall is fairly thick, and of nearly uniform texture, except for the points noted. A thin film of light-coloured material covers the attachment, as a floor to the chamber.

From the records, this species is very widely distributed, but is characteristic of cold waters. The Arctic specimens do not have the same shape as those from the Pacific coast of America, for instance, and it may be that more than one species has been included by various writers under this specific name.

Tholosina vesicularis (H. B. Brady.)

Placopsilina vesicularis H. B. Brady, Quart. Journ. Micros. Sci. vol. 19, 1879, p. 51, pl. 5, fig. 2, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 316, pl. 35, figs. 18, 19.—Heron-Allen and Earland, Proc. Roy. Irish Acad. vol. 31, pt. 64, 1913, p. 47.

Tholosina vesicularis Rhumbler, Arch. Prot., vol. 3, 1903, p. 227, fig. 53 (in text). Awerinzew, Mem. Acad. Imp. Sci. St. Petersburg, ser. 8, vol. 29, No. 3, 1911, p. 8.—Cushman, Bull. 104, U.S. Nat. Mus. pt. 1, 1918, p. 65.

A single incomplete specimen attached to a fragment of worm tube was obtained from station 20 *b-c*. It has the characteristic mosaic appearance on the exterior, due to the rather evenly distributed dark and light sand grains and the still lighter cement, the surfaces evenly placed so that the whole exterior is comparatively smooth.

T. vesicularis is a characteristic species of northern latitudes and cold waters. Awerinzew records it from 35-42 meters in the Siberian Arctic, and Kiaer from the Arctic, near King Oscar's land and Greenland. I have found it abundant in the cold water off the New England coast, and it is common in cold waters of the Shetland-Faroe channel, according to Heron-Allen and Earland.

Ammobaculites cassis (Parker.)

(Plate I, figure 3.)

Lituola cassis Parker, in Dawson, Canad. Nat., vol. 5, 1870, pp. 117, 180, fig. 3.

Haplophragmium cassis B. H. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 304, pl. 33, figs. 17-19.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 24, pl. 5, figs. 152-157.—Flint, Ann. Rep. U.S. Nat. Mus., 1897 (1899), p. 275, pl. 19, fig. 4.—Awerinzew, Mem. Acad. Imp. Sci. St. Petersburg, ser. 8, vol. 29, No. 3, 1911, p. 20.

A rather broad form of this species occurred at station 20 *b-c*. The material of the test is made up of rather coarse quartz grains, smoothly cemented with a reddish brown cement, making a neat and even surface. Occasional sponge spicules are included in the test.

The species seems to be characteristic of cold shallow water of Arctic and subarctic regions. It was described by Parker from Gaspé bay, at the mouth of the St. Lawrence, in 16 fathoms. Brady records it from Lievely harbour, Disko, Greenland, in 5-20 fathoms, and from Deva bay, Spitzbergen, in 7 fathoms. Flint records it from Portland, Maine, in 4-5 fathoms. Kiaer records it off Nova Zembla, at a depth of 15 fathoms, and Awerinzew from the Siberian Arctic, north of the New Siberian islands, at a depth of 38 meters.

Haplophragmoides canariensis d'Orbigny.

Specimens referred to this species were obtained at stations 23 and 43*a*. They are not typical. So many forms have been included under this name that the original characters, described by d'Orbigny, have nearly been lost sight of, and the name has come to stand for a varied assemblage of things. Under this name Awerinzew records specimens from several Siberian Arctic localities, but gives no figures or description. Further research may show that there is a characteristic Arctic species, which has been included under this name.

Trochammina nana (H. B. Brady.)

(Plate I, figure 4.)

Haplophragmium nanum H. B. Brady, Quart. Journ. Micros. Sci. vol. 21, 1881, p. 50, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 311, pl. 35, figs. 6-8.—Awerinzew, Mem. Acad. Imp. Sci. St. Petersburg, ser. 8, vol. 29, No. 3, 1911, p. 21.

Trochammina nana Cushman, Bull. 71, U.S. Nat. Mus., pt. 1, 1910, p. 123, figs. 190-192.—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1010.

Several very typical specimens were obtained at Station 29*g*. These have a reddish brown cement, giving colour to all but the last-formed chamber, which is in all cases lighter in colour than the rest, often nearly white.

From the records this species seems to be characteristic of cold waters. Brady gives the most characteristic material from off Franz Josef land, very abundant at depths of 89-145 fathoms. He also records it from Nova Zembla, 55-219 fathoms. Kiäer records it from the American Arctic, and Awerinzew from several stations in the Siberian Arctic. Pearcey records it from the Antarctic, and from Stanley harbour, Falkland islands, in 25 fathoms. There are numerous records of its occurrence in deep cold waters of the various ocean basins.

Trochammina squamata Jones and Parker.

Trochammina squamata Jones and Parker, Quart. Journ. Geol. Soc., vol. 16, 1860, p. 304.—W. B. Carpenter, Parker and Jones, Intr. Foram., 1862, p. 141, pl. 11, fig. 1.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 337, pl. 41, figs. 3 *a-c*.—Cushman, Bull. 71, U.S. Nat. Mus., pt. 1, 1910, p. 120, fig. 187*a*, *b*.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 50, pl. 3, figs. 7-10.

Several specimens from station 20 *b-c*, with occasional spicules in addition to the sand grains, yellowish brown in colour, the underside with the last-formed chamber, large and scale-like, covering nearly one-third the area of the whole base.

From station 43*c* there is a single specimen, somewhat thicker but generally similar.

Here again it is possible that more than one species have been included under one name by various writers. The species is not a characteristic Arctic one.

Spiroplecta biformis (Parker and Jones.)

Textularia agglutinans, var. *biformis* Parker and Jones, Phil. Trans., vol. 155, 1865, p. 370, pl. 15, figs. 23, 24.

Textularia biformis H. B. Brady, Ann, Mag. Nat. Hist., ser. 5, vol. 1, 1878, p. 436, pl. 20, fig. 8.

Spiroplecta biformis H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 376, pl. 45, figs. 25-27.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, No. 9, 1894, p. 38, pl. 7, figs. 308-312.—Awerinzew, Mem. Acad. Imp. Sci., St. Petersburg, ser. 8, vol. 29, No. 3, 1911, p. 17.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 56.—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1012.

A single specimen from station 29*g* with the initial end broken, but the characteristic marks so clearly in evidence that there is no question of its identity. This is a characteristic Arctic and cold-water species. Brady records it from Franz-Josef land, 113-145 fathoms; west coast of Nova Zembla, 55-70 fathoms;

Baffin bay and Smith sound, 27-80 fathoms, and Hunde islands, Davis strait, 60-70 fathoms. Goës records it from various Scandinavian and Arctic localities, including Spitzbergen. Heron-Allen and Earland record it from the coast of Ireland, and Pearcey from the Antarctic, in 2,110 fathoms. There are very few other records of its occurrence in the cold deep waters of the ocean basins. Awerinzew records it from Barents sea and Nordenskiöld sea, north of Siberia. The species is therefore characteristic of such cold waters as those of the Arctic and deeper waters elsewhere.

Textularia gramen d'Orbigny.

Two poor specimens of small size, but resembling this species, were obtained at station 43*g*. They are made of very soft, light-coloured amorphous material.

Verneuilina polystropha Reuss.

(Plate I, figure 5.)

A very few specimens were obtained which are referred to this species. From station 20*b-c*. They are very slender, many-chambered, in some ways resembling *Gaudryina apicularis* Cushman (*G. siphonella* Brady, not Reuss), but are triserial throughout like *Verneuilina*. From station 43*c* there is a single specimen in general similar but slightly broader. They may represent an undescribed species, but the material is not sufficient to warrant a full description at present.

In this connection it is of interest to note that Brady gives *V. polystropha* as occurring as far north as Nova Zembla, Baffin bay, and Davis strait.

Bulimina pyrula d'Orbigny.

Bulimina pyrula d'Orbigny, For. Foss. Vienne, 1846, p. 184, pl. 11, figs. 9, 10.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 399, pl. 50, figs. 7-10.

A very few specimens from stations 20*b-c*, 27*s*, and 29*a*, seem to belong to this species. It has been found as far north as 70° off Norway, but is not a characteristic cold-water form.

Cassidulina laevigata d'Orbigny.

Cassidulina laevigata d'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 282, pl. 15, figs. 5, 4.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 428, pl. 54, figs. 1-3.—Cushman, Bull. 71, U.S. Nat. Mus., pt. 2, 1911, p. 96, fig. 150, in text.—Awerinzew, Mem. Acad. Imp. Sci., St. Petersburg, ser. 8, vol. 29, No. 3, 1911, p. 18.

Specimens occurred at stations 29*a* and 43*b*. Although a very widely distributed species, as is also the following, they are both found in a large number of soundings from high latitudes both north and south. Both species occur in Brady's table of species from high latitudes, and occur at nearly all the stations tabulated there. Awerinzew found both species in material from the Siberian Arctic, *C. crassa* being perhaps the more characteristic.

Cassidulina crassa d'Orbigny.

Cassidulina crassa d'Orbigny, Foram. Amér. Mérid., 1839, p. 56, pl. 7, figs. 18-20.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 429, pl. 54, figs. 4, 5.—Cushman, Bull. 71, U.S. Nat. Mus., pt. 2, 1911, p. 97, figs. 151*a-c*. Awerinzew, Mem. Acad. Imp. Sci., St. Petersburg, ser. 8, vol. 29, No. 3, 1911, p. 18.

Specimens were obtained from station 29*a* and were frequent in station 29*j*. Brady mentions its occurrence as far north as 83° 19′ and the shores of Franz Josef land and Spitzbergen.

Lagena laevigata Reuss.

Fissurina laevigata Reuss, Denkschr. Akad. Wiss. Wien, vol. 1, 1899, p. 366, pl. 46, fig. 1.

Lagena laevigata Terrigi, Atti. Accad. Pont. Nuovi Lincei, vol. 33, 1880, p. 177, pl. 1, fig. 6.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 473, pl. 114, figs. 8*a*, *b*.—Cushman, Bull. 71, U.S. Nat. Mus., pt. 3, 1913, p. 7, pl. 2, fig. 1.

A single specimen slightly compressed, and somewhat longer than broad, was found in the material from station 29*a*. It is a species usually found in deep and cold waters.

Nodosaria aequalis (Reuss.)

Glandulina aequalis Reuss, Sitz. Akad. Wiss. Wien, vol. 48, 1863, p. 48, pl. 3, fig. 28.

Nodosaria aequalis H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 492, pl. 61, fig. 32.

A few specimens from station 29*j*. Awerinzew records *N. calomorpha* Reuss from the Siberian Arctic and possibly the two may be the same, although these specimens are too large and too thick set for the ordinary form usually assigned to this species.

Polymorphina lanceolata Reuss.

Polymorphina lanceolata Reuss, Zeitschr. Deutsch. Geol. Gesell., vol. 3, 1851, p. 83, pl. 6, fig. 50—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 564, pl. 72, figs. 5, 6.

A few specimens from station 29*j* in various stages of development, only one of them fully adult. Awerinzew records *P. acuta* Reuss from the Siberian Arctic.

Truncatulina pygmaea Hantken.

Truncatulina pygmea Hautken, Mitth. Jahrb. Ung. Geol. Anstalt., vol. 4, 1875, p. 78, pl. 10, fig. 8.—H. B. Brady, Rep. voy. *Challenger*, Zoology, vol. 9, 1884, p. 666, pl. 95, figs. 9, 10.—Cushman, Bull. 71, U.S. Nat. Mus., pt. 5, 1915, p. 38, figs. 41 *a-c* in test.—Pearcey, Trans. Roy. Soc., Edinburgh, vol. 49, 1914, p. 1027.

A few specimens, very similar to the figures given in the *Challenger* report, were obtained at Station 29*a*. The species seems to be characteristic of deep, cold waters. Pearcey records it from six stations in the Antarctic.

Truncatulina lobatula Walker and Jacob.

Truncatulina lobatula Walker and Jacob, Adam's Essays, Kanmacher's ed., 1798, p. 642, pl. 14, fig. 36.

Truncatulina lobatula d'Orbigny, in Barker, Webb and Berthelot, Hist. Nat. Isles Canaries, vol. 2, pt. 2, "Foraminifères," 1839, p. 134, pl. 2, figs. 22-24.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 660, pl. 92, fig. 10; pl. 93, figs. 1, 4, 5; pl. 95, figs. 4, 5.—Awerinzew, Mem. Acad. Imp. Sci., St. Petersburg, ser. 8, vol. 29, No. 3, 1911, p. 23.—

Cushman, Bull. 71, U.S. Nat. Mus. pt. 5, 1915, p. 31, pl. 15, fig. 1.—Pearcey, Trans. Roy. Soc., Edinburgh, vol. 49, 1914, p. 1027.

At 22 they were attached to *Buccinum cyaneum*, one being in the centre of the operculum of a living specimen.

Specimens occurred at Stations 29*e*, 43*a*, and 43*b*. At 43*a* they were attached to shells of *Arca, Pseudamusium and Margarites.*

This is one of the very widely distributed species from the records. It is very abundant in shallow cold waters. Awerinzew records it from the Siberian Arctic, and Pearcey from six stations in the Antarctic.

Nonionina depressula (Walker and Jacob.)

Nautilus depressulus Walker and Jacob, Adam's Essays, Kanmacher's ed., 1798, p. 641, pl. 14, fig. 33.

Nonionina depressula Parker and Jones, Ann. Mag. Nat. Hist. ser. 3, vol. 4, 1859, pp. 339, 341.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 725, pl. 109, figs. 6, 7.—Awerinzew, Mem. Acad. Imp. Sci., St. Petersburg, ser. 8, vol. 29, No. 3, 1911, p. 24.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 4, 1914, p. 23, pl. 17, fig. 3.

Typical specimens were obtained from stations 23 and 43*c*. Brady records it from as far north as latitude 82° 33′ N., as well as from Baffin bay, Smith sound, Hunde islands, Davis strait, Nova Zembla, and Franz Josef land. Awerinzew records it from the Siberian Arctic. It has been recorded from warmer shallow waters as well, but it is possible that further study may show these to be different species.

Nonionina stelligera d'Orbigny.

Nonionina stelligera d'Orbigny, in Barker, Webb, and Berthelot, Hist. Nat. Isles Canaries, vol. 2, pt. 2, Foraminifères, 1839, p. 128, pl. 3, figs. 1, 2.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 728, pl. 109, figs. 3-5.—Göes, Kongl. Svensk. Vet. Akad. Handl., vol. 25, 1894, p. 104, pl. 17, figs. 827, 828.—Awerinzew, Mem. Acad. Imp. Sci., St. Petersburg, ser. 8, vol. 29, No. 3, 1911, p. 25.—Cushman, Bull. 71, U.S. Nat. Mus., pt. 4, 1914, p. 27, pl. 14, fig. 4; pl. 15, fig. 4; pl. 16, fig. 2. Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 144.—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1030.

Specimens were rare at stations 43*a* and 43*c*. Brady records it from Arctic localities north as far as latitude 82° 33′ N. in Smith sound, and from the shores of Spitzbergen, Franz Josef land, and Nova Zembla. Awerinzew records it at five stations in the Siberian Arctic. Pearcey records it from the Antarctic. It has been found by Heron-Allen and Earland from the northern and western coasts of the British isles. Most of the other records are from deep water, but it has also been recorded from the Mediterranean, and the type locality is shore sand from the Canaries.

Polystomella striato-punctata Fichtel and Moll, var. **incerta** (Williamson).

The varietal form of this species, with its fewer and more irregular depressions along the sutural lines, was found at stations 20*b-c*, 27*s*, and 29*a*.

A great variety of forms have been included by writers under *P. striato-punctata*, and as a result it is seemingly distributed wherever foraminifera are found. Awerinzew has recorded var. *incerta* from the Siberian Arctic, and Kiaer from the American Arctic. Williamson's original material was from the British isles.

Polystomella arctica Parker and Jones.

Polystomella arctica Parker and Jones, in Brady, Trans. Linn. Soc., London, vol. 24, 1864, p. 471, pl. 48, fig. 18.–Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 735, pl. 110, figs. 2-5.—Awerinzew, Mem. Acad. Imp. Sci., St. Petersburg, ser. 8, vol. 29, No. 3, 1911, p. 26.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 146.

A single but typical specimen was obtained at Station 43*a*, and it was common at Station 29*j*. From all the records this seems to be a circumpolar species confined to the Arctic. Brady records it as far north as latitude 82° 27′ N., in Smith sound, also from Baffin bay, Davis strait, and from the region of Spitzbergen, Franz Josef land, and Nova Zembla. It is known from the Siberian Arctic, recorded by Awerinzew. The work of Heron-Allen and Earland has extended the distribution to certain localities as far south as the east coast of Ireland.

Polystomella subnodosa (Münster.)

Robulina subnodosa Münster (*fide* Roemer), Neues Jahrb. für. Min., 1838, p. 391, pl. 3, fig. 61.

Polystomella subnodosa Reuss, Sitz. Akad. Wiss. Wien, vol. 18, 1855, p. 240, pl. 4, fig. 51, *a*, *b*.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 734, pl. 110, fig. 1 *a*, *b*.

Several specimens at station 29*j*. I am referring to this species certain specimens found at this station. They are of the form and size of *P. subnodosa*, but like other arctic species of the genus there are developed double rows of pores along the sutures. This is one of the species recorded by Awerinzew from the Siberian Arctic. It may prove to be distinct from the form referred to this species from lower latitudes.

Cornuspira foliacea (Philippi.)

Orbis foliaceus Philippi, Enum. Moll. Siciliae, vol. 2, 1844, p. 147, pl. 24, fig. 26.

Spirillina foliacea Williamson, Rec. Foram. Great Britain, 1858, p. 91, pl. 7, figs. 199-201.

Cornuspira foliacea Carpenter, Parker and Jones, Introd. Foram., 1862, p. 68, pl. 5, fig. 16.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 199, pl. 11, figs. 5-9.—Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 25, 1894, p. 106, pl. 18, fig. 834.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 24, pl. 1, fig. 1, pl. 2, fig. 1.—Awerinzew, Mem. Acad. Imp. Sci., St. Petersburg, ser. 8, vol. 29, No. 3, 1911, p. 14.

Specimens were picked out by the collector, giving clean examples for study, from stations 27*s*, 41, and 41*c*. I found a few young specimens in washing the material from stations 29*g* and 29j. The large, well-developed specimens are filled with a yellowish brown protoplasm. The test in these Arctic specimens is thicker and heavier than those from farther south, and the flaring condition of the test is not so early taken on. The largest specimen measured 10mm. in length, which seems to be a record for the species. Brady recorded the species from north of Smith sound and from Davis strait. Awerinzew records it from the Siberian Arctic, and Goës from Spitzbergen. Pearcey records it from the Antarctic, and it has been found in all the great ocean basins, but is much more common in the Atlantic than in the Pacific.

Quinqueloculina seminulum Linné.

Two specimens, each partially broken, are referred to this common elongate species, which seems to be very widely distributed. They are from station 29*g*.

Quinqueloculina subrotunda Montagu.

Two specimens, apparently of this common and widely distributed species, were obtained from station 23.

Specimens were also found attached to the shell of *Buccinum cyaneum* from station 22. Awerinzew records this species of *Quinqueloculina* from the Siberian Arctic.

EXPLANATION OF PLATE.

Fig. 1. *Hyperammina subnodosa*, with attached specimens of *Tholosina bulla*. This is apparently a megalospheric specimen, the proloculum being greater in diameter than the tubular chamber, and the entire length less than the full grown microspheric form, fig. 2. x 10. From station 43*a*.

Fig. 2. *Hyperammina subnodosa*, with attached specimens of *Tholosina bulla*. A microspheric specimen of *H. subnodosa* with the diameter of the proloculum less than that of the tubular chamber and the whole test large. x 10. From Station 43*a*.

Fig. 3. *Ammobaculites cassis*, side view of very broad form, found in the Canadian Arctic Expedition material. This is much broader than the usual specimens from other regions, x 20. From Station 20 *b-c*.

Fig. 4. *Trochammina nana*, ventral view, the last formed chamber very light in colour compared to the earlier ones. x 125. From Station 29*g*.

Fig. 5. *Verneuilina polystropha* (?), side view of a very slender form found in the Arctic material. x 125. From Station 20 *b-c*.

PLATE I.